

Claims

- [c1] 1. A process of fabrication a semiconductor structure, comprising:
providing a substrate;
forming a dielectric layer over the substrate;
forming a hydrophilic material layer over the dielectric layer; and
forming a hardmask layer over the hydrophilic material layer.
- [c2] 2. The process of claim 1, wherein after forming the hydrophilic material layer over the dielectric layer and before forming the hardmask layer over the hydrophilic material layer, further comprises:
performing a planarization process on an edge of at least one of the substrate, the dielectric layer, the hydrophilic material layer or a combination thereof.
- [c3] 3. The process of claim 2, wherein the planarization process comprises at least one of an upper bevel polish, a lower bevel polish, a side polish or a combination thereof.
- [c4] 4. The process of claim 1, wherein a method of forming

the dielectric layer comprises a spin on coating method or a chemical vapor deposition method.

- [c5] 5. The process of claim 1, wherein a material of the dielectric layer comprises an organic dielectric material, a carbon-containing dielectric material or a carbon-containing oxide material.
- [c6] 6. The process of claim 1, wherein the dielectric layer is composed of at least a precursor comprising tetramethyl-cyclotetra-siloxane (TMCTS), trimethyl-silane (3MS), tetramethyl-silane (4MS), dimethyl-dimethoxy-silane (DMDMOS), octamethyl-cyclotetra-siloxane (OMCTS), diethoxy-methyl-silane (DEMS), or tetramethyl-disiloxane (TMDSO).
- [c7] 7. The process of claim 1, wherein a material of the hydrophilic material layer comprises silane (SiH_4) containing material, tetraethyl-ortho-silicate (TEOS) oxide containing material or silicon nitride.
- [c8] 8. The process of claim 1, wherein a material of the hardmask layer comprises aluminum (Al), titanium nitride, tantalum nitride, titanium silicon nitride (TiSiN), tungsten nitride, tungsten silicon nitride (WSiN) or refractory nitride.
- [c9] 9. A semiconductor structure, comprising:

a substrate;
a dielectric layer, disposed over the substrate;
a hydrophilic material layer, disposed over the dielectric layer; and
a hardmask layer, disposed over the hydrophilic material layer.

[c10] 10. The structure of claim 9, wherein after the hydrophilic material layer is disposed over the dielectric layer and before the hardmask layer is disposed over the hydrophilic material layer, further comprises:
polishing an edge of the structure of semiconductor.

[c11] 11. The structure of claim 9, wherein a method of forming the dielectric layer comprises a spin on coating method or a chemical vapor deposition method.

[c12] 12. The structure of claim 9, wherein a material of the dielectric layer comprises an organic dielectric material, a carbon-containing dielectric material or a carbon-containing oxide material.

[c13] 13. The structure of claim 9, wherein the dielectric layer is composed of at least a precursor comprising tetramethyl-cyclotetra-siloxane (TMCTS), trimethyl-silane (3MS), tetramethyl-silane (4MS), dimethyl-dimethoxy-silane (DMDMOS), octamethyl-cyclote-

tra-siloxane (OMCTS), diethoxy-methyl-silane (DEMS), or tetramethyl-disiloxane (TMDSO).

[c14] 14. The structure of claim 9, wherein a material of the hydrophilic material layer comprises silane (SiH_4) containing material, tetraethyl-ortho-silicate (TEOS) oxide containing material or silicon nitride.

[c15] 15. The structure of claim 9, wherein a material of the hardmask layer comprises aluminum (Al), titanium nitride, tantalum nitride, titanium silicon nitride (TiSiN), tungsten nitride, tungsten silicon nitride (WSiN) or refractory nitride.

[c16] 16. A semiconductor structure, comprising:
a substrate;
a first dielectric layer, disposed over the substrate;
a first hydrophilic material layer, disposed over the first dielectric layer;
a first hardmask layer, disposed over the first hydrophilic material layer;
a second dielectric layer, disposed over the first hardmask layer;
a second hydrophilic material layer, disposed over the second dielectric layer; and
a second hardmask layer, disposed over the second hydrophilic material layer.

- [c17] 17. The structure of claim 16, wherein a via is disposed in the first dielectric layer, the first hydrophilic material layer and the first hardmask layer.
- [c18] 18. The structure of claim 17, wherein a trench is disposed in the second dielectric layer, the second hydrophilic material layer and the second hardmask layer, and wherein the via is exposed within the trench.
- [c19] 19. The structure of claim 18, wherein a metal is disposed in the via and the trench.
- [c20] 20. The structure of claim 16, wherein after the first hydrophilic material layer is disposed over the first dielectric layer and before the first hardmask layer is disposed over the first hydrophilic material layer, further comprises:
polishing an edge of the structure of semiconductor.
- [c21] 21. The structure of claim 16, wherein after the second hydrophilic material layer is disposed over the second dielectric layer and before the second hardmask layer is disposed over the second hydrophilic material layer, further comprises:
polishing an edge of the structure of semiconductor.
- [c22] 22. The structure of claim 16, wherein a method of

forming the first dielectric layer or the second dielectric layer comprises a spin on coating method or a chemical vapor deposition method.

- [c23] 23. The structure of claim 16, wherein a material of the first dielectric layer or a material of the second dielectric layer comprises an organic dielectric material, a carbon-containing dielectric material or a carbon-containing oxide material.
- [c24] 24. The structure of claim 16, wherein the first dielectric layer or the second dielectric layer is composed of at least a precursor comprising tetramethyl-cyclotetra-siloxane (TMCTS), trimethyl-silane (3MS), tetramethyl-silane (4MS), dimethyl-dimethoxy-silane (DMDMOS), octamethyl-cyclotetra-siloxane (OMCTS), diethoxy-methyl-silane (DEMS), or tetramethyl-disiloxane (TMDSO).
- [c25] 25. The structure of claim 16, wherein a material of the first hydrophilic material layer or a material of the second hydrophilic material comprises silane (SiH_4) containing material, tetraethyl-ortho-silicate (TEOS) oxide containing material or silicon nitride.
- [c26] 26. The structure of claim 16, wherein a material of the first hardmask layer or a material of the second hard-

mask layer comprises aluminum (Al), titanium nitride, tantalum nitride, titanium silicon nitride (TiSiN), tungsten nitride, tungsten silicon nitride (WSiN) or refractory nitride.